

SEQUENCE LISTING



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Botterman, Johan
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<120> RECOMBINANT PLANT EXPRESSING NON-COMPETITIVELY BINDING Bt
INSECTICIDAL CRYSTAL PROTEINS

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<140> 10/809,953
<141> 2004-03-26

<150> 09/661.061
<151> 2000-09-13

<150> PCT/EP/00905
<151> 1990-05-30

<150> GB 89401499.2
<151> 1989-05-31

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<170> PatentIn version 3.3

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cct tac aat tgt tta agt aat cct aag gag ata ata tta ggc gag gaa 341
Pro Tyr Asn Cys Leu Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu
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Arg Leu Glu Thr Gly Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile
30 35 40

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Asn Phe Leu Tyr Ser Asn Phe Val Pro Gly Gly Phe Ile Val Gly
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Lys Val Tyr Val Arg Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn
110 115 120

cct gct tta agg gaa atg cgt ata caa ttt aat gac atg aat agt 677
Pro Ala Leu Arg Glu Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser
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Ala Leu Leu Ser Val Tyr Val Gln Ala Ala Asn Leu His Leu Ser Ile			
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Thr Ile Asn Asn Arg Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr			
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act aac cat tgt gtg gat acg tat aat cag gga tta agg cgt ttg gaa			917
Thr Asn His Cys Val Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu			
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Gly Arg Phe Leu Ser Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln			
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Leu Thr Ile Ser Val Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp			
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att aga aca tat cca att caa aca gct act cag cta acg agg gaa gtc			1061
Ile Arg Thr Tyr Pro Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val			
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Tyr Leu Asp Leu Pro Phe Ile Asn Gln Asn Leu Ser Pro Ala Ala Ser			
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Tyr Pro Thr Phe Ser Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His			
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Leu Val Asp Phe Leu Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala			
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cgt tat gca tat tgg gga ggg cac ttg gta aat tct ttc cgc aca gga			1253
Arg Tyr Ala Tyr Trp Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly			
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acc act act aat ttg ata aga tcc cct tta tat gga agg gaa gga aat			1301
Thr Thr Asn Leu Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn			
335	340	345	
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Thr Glu Arg Pro Val Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe			
350	355	360	
aga aca ctt tca tat att aca ggc ctt gac aat tca aat cct gta gct			1397
Arg Thr Leu Ser Tyr Ile Thr Gly Leu Asp Asn Ser Asn Pro Val Ala			
365	370	375	
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Gly Ile Glu Gly Val Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr			
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Arg Lys Ser Gly Pro Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp			
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Ala Ser Val Ser Pro Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala			
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Thr Phe Leu Glu Arg Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe			
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765	770	775		
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Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp				
780	785	790		
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Leu His Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser His				
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Arg Leu Gly Asn Leu Glu Phe Leu Glu Lys Pro Leu Leu Gly Glu				
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Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
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Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp Gly
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Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val
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610 615 620

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625 630 635 640

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His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
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Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
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755 760 765

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770 775 780

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg
785 790 795 800

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Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
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885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met
900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
930 935 940

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945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
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Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
980 985 990

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
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Ile Asp Ile Ser Leu Ser Leu Val Gln Phe Met Val Ser Asn Phe Val
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Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile Glu Gln Leu Ile
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Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu
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Leu Gln Asp Pro Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly
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Trp Arg Gly Ser Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe
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caa	cgc	tat	tat	gag	cgc	caa	gtg	gaa	cga	acg	aga	gat	tat	tcc	gac	672
Gln	Arg	Tyr	Tyr	Glu	Arg	Gln	Val	Glu	Arg	Thr	Arg	Asp	Tyr	Ser	Asp	
210				215						220						
tat	tgc	gta	gaa	tgg	tat	aat	aca	ggt	cta	aat	agc	ttg	aga	ggg	aca	720
Tyr	Cys	Val	Glu	Trp	Tyr	Asn	Thr	Gly	Leu	Asn	Ser	Leu	Arg	Gly	Thr	
225				230					235			240				
aat	gcc	gca	agt	tgg	gta	cgg	tat	aat	caa	ttc	cgt	aga	gat	cta	acg	768
Asn	Ala	Ala	Ser	Trp	Val	Arg	Tyr	Asn	Gln	Phe	Arg	Arg	Asp	Leu	Thr	
245					250					255						
tta	gga	gta	tta	gat	cta	gtg	gca	cta	ttc	cca	agc	tat	gac	act	cgc	816
Leu	Gly	Val	Leu	Asp	Leu	Val	Ala	Leu	Phe	Pro	Ser	Tyr	Asp	Thr	Arg	
260				265					270							
act	tat	cca	ata	aat	acg	agt	gct	cag	tta	aca	aga	gaa	gtt	tat	aca	864
Thr	Tyr	Pro	Ile	Asn	Thr	Ser	Ala	Gln	Leu	Thr	Arg	Glu	Val	Tyr	Thr	
275				280					285							
gac	gca	att	gga	gca	aca	ggg	gta	aat	atg	gca	agt	atg	aat	tgg	tat	912
Asp	Ala	Ile	Gly	Ala	Thr	Gly	Val	Asn	Met	Ala	Ser	Met	Asn	Trp	Tyr	
290				295					300							
aat	aat	aat	gca	cct	tgc	ttc	tct	gcc	ata	gag	gct	gcg	gct	atc	cga	960
Asn	Asn	Asn	Ala	Pro	Ser	Phe	Ser	Ala	Ile	Glu	Ala	Ala	Ala	Ile	Arg	
305				310					315			320				
agc	ccg	cat	cta	ctt	gat	ttt	cta	gaa	caa	ctt	aca	att	ttt	agc	gct	1008
Ser	Pro	His	Leu	Leu	Asp	Phe	Leu	Glu	Gln	Leu	Thr	Ile	Phe	Ser	Ala	
325				330					335							
tca	tca	cga	tgg	agt	aat	act	agg	cat	atg	act	tat	tgg	cg	ggg	cac	1056
Ser	Ser	Arg	Trp	Ser	Asn	Thr	Arg	His	Met	Thr	Tyr	Trp	Arg	Gly	His	
340				345					350							
acg	att	caa	tct	cg	cca	ata	gga	ggc	gga	tta	aat	acc	tca	acg	cat	1104
Thr	Ile	Gln	Ser	Arg	Pro	Ile	Gly	Gly	Gly	Leu	Asn	Thr	Ser	Thr	His	
355				360					365							
ggg	gct	acc	aat	act	tct	att	aat	cct	gta	aca	tta	cg	ttc	gca	tct	1152
Gly	Ala	Thr	Asn	Thr	Ser	Ile	Asn	Pro	Val	Thr	Leu	Arg	Phe	Ala	Ser	
370				375					380							
cga	gac	gtt	tat	agg	act	gaa	tca	tat	gca	gga	gtg	ctt	cta	tgg	gg	1200
Arg	Asp	Val	Tyr	Arg	Thr	Glu	Ser	Tyr	Ala	Gly	Val	Leu	Leu	Trp	Gly	
385				390					395			400				
att	tac	ctt	gaa	cct	att	cat	gg	gt	tc	ct	act	gtt	agg	ttt	aat	1248
Ile	Tyr	Leu	Glu	Pro	Ile	His	Gly	Val	Pro	Thr	Val	Arg	Phe	Asn	Phe	
405				410					415							
acg	aac	cct	cag	aat	att	tct	gat	aga	ggt	acc	gct	aac	tat	agt	caa	1296
Thr	Asn	Pro	Gln	Asn	Ile	Ser	Asp	Arg	Gly	Thr	Ala	Asn	Tyr	Ser	Gln	
420				425					430							
cct	tat	gag	tca	cct	ggg	ctt	caa	tta	aaa	gat	tca	gaa	act	gaa	tta	1344

Pro	Tyr	Glu	Ser	Pro	Gly	Leu	Gln	Leu	Lys	Asp	Ser	Glu	Thr	Glu	Leu	
435																445
cca	cca	gaa	aca	aca	gaa	cga	cca	aat	tat	gaa	tct	tac	agt	cac	agg	1392
Pro	Pro	Glu	Thr	Thr	Glu	Arg	Pro	Asn	Tyr	Glu	Ser	Tyr	Ser	His	Arg	
450																460
tta	tct	cat	ata	ggt	ata	att	tta	caa	tcc	agg	gtg	aat	gta	ccg	gta	1440
Leu	Ser	His	Ile	Gly	Ile	Ile	Leu	Gln	Ser	Arg	Val	Asn	Val	Pro	Val	
465																480
470																475
tat	tct	tgg	acg	cat	cgt	agt	gca	gat	cgt	acg	aat	acg	att	gga	cca	1488
Tyr	Ser	Trp	Thr	His	Arg	Ser	Ala	Asp	Arg	Thr	Asn	Thr	Ile	Gly	Pro	
485																495
aat	aga	atc	acc	caa	atc	cca	atg	gta	aaa	gca	tcc	gaa	ctt	cct	caa	1536
Asn	Arg	Ile	Thr	Gln	Ile	Pro	Met	Val	Lys	Ala	Ser	Glu	Leu	Pro	Gln	
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ggt	acc	act	gtt	gtt	aga	gga	cca	gga	ttt	act	ggt	ggg	gat	att	ctt	1584
Gly	Thr	Thr	Val	Val	Arg	Gly	Pro	Gly	Phe	Thr	Gly	Gly	Asp	Ile	Leu	
515																525
cga	aga	acg	aat	act	ggt	gga	ttt	gga	ccg	ata	aga	gta	act	gtt	aac	1632
Arg	Arg	Thr	Asn	Thr	Gly	Gly	Phe	Gly	Pro	Ile	Arg	Val	Thr	Val	Asn	
530																540
gga	cca	tta	aca	caa	aga	tat	cgt	ata	gga	ttc	cgc	tat	gct	tca	act	1680
Gly	Pro	Leu	Thr	Gln	Arg	Tyr	Arg	Ile	Gly	Phe	Arg	Tyr	Ala	Ser	Thr	
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550																555
gta	gat	ttt	gat	ttc	ttt	gta	tca	cgt	gga	ggt	act	act	act	gta	aat	1728
Val	Asp	Phe	Asp	Phe	Phe	Val	Ser	Arg	Gly	Gly	Thr	Thr	Val	Asn	Asn	
565																575
ttt	aga	ttc	cta	cgt	aca	atg	aac	agt	gga	gac	gaa	cta	aaa	tac	gga	1776
Phe	Arg	Phe	Leu	Arg	Thr	Met	Asn	Ser	Gly	Asp	Glu	Leu	Lys	Tyr	Gly	
580																590
aat	ttt	gtg	aga	cgt	gct	ttt	act	aca	cct	ttt	act	ttt	aca	caa	att	1824
Asn	Phe	Val	Arg	Arg	Ala	Phe	Thr	Thr	Pro	Phe	Thr	Phe	Thr	Gln	Ile	
595																605
caa	gat	ata	att	cga	acg	tct	att	caa	ggc	ctt	agt	gga	aat	ggg	gaa	1872
Gln	Asp	Ile	Ile	Arg	Thr	Ser	Ile	Gln	Gly	Leu	Ser	Gly	Asn	Gly	Glu	
610																620
gtg	tat	ata	gat	aaa	att	gaa	att	att	cca	gtt	act	gca	acc	ttc	gaa	1920
Val	Tyr	Ile	Asp	Lys	Ile	Glu	Ile	Ile	Pro	Val	Thr	Ala	Thr	Phe	Glu	
625																630
635																640
gca	gaa	tat	gat	tta	gaa	aga	gcg	caa	gag	gcg	gtg	aat	gct	ctg	ttt	1968
Ala	Glu	Tyr	Asp	Leu	Glu	Arg	Ala	Gln	Glu	Ala	Val	Asn	Ala	Leu	Phe	
645																650
655																655
act	aat	acg	aat	cca	aga	aga	ttg	aaa	aca	gat	gtg	aca	gat	tat	cat	2016
Thr	Asn	Thr	Asn	Pro	Arg	Arg	Leu	Lys	Thr	Asp	Val	Thr	Asp	Tyr	His	
660																665
670																670
att	gat	caa	gta	tcc	aat	tta	gtg	gcg	tgt	tta	tcg	gat	gaa	ttc	tgc	2064

Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser Asp Glu Phe Cys			
675	680	685	
ttg gat gaa aag aga gaa tta ctt gag aaa gtg aaa tat gcg aaa cga			2112
Leu Asp Glu Lys Arg Glu Leu Leu Glu Lys Val Lys Tyr Ala Lys Arg			
690	695	700	
ctc agt gat gaa aga aac tta ctc caa gat cca aac ttc aca tcc atc			2160
Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn Phe Thr Ser Ile			
705	710	715	720
aat aag caa cca gac ttc ata tct act aat gag caa tcg aat ttc aca			2208
Asn Lys Gln Pro Asp Phe Ile Ser Thr Asn Glu Gln Ser Asn Phe Thr			
725	730	735	
tct atc cat gaa caa tct gaa cat gga tgg tgg gga agt gag aac att			2256
Ser Ile His Glu Gln Ser Glu His Gly Trp Trp Gly Ser Glu Asn Ile			
740	745	750	
acc atc cag gaa gga aat gac gta ttt aaa gag aat tac gtc aca cta			2304
Thr Ile Gln Glu Gly Asn Asp Val Phe Lys Glu Asn Tyr Val Thr Leu			
755	760	765	
ccg ggt act ttt aat gag tgt tat ccg acg tat tta tat caa aaa ata			2352
Pro Gly Thr Phe Asn Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile			
770	775	780	
ggg gag tcg gaa tta aaa gct tat act cgc tac caa tta aga ggt tat			2400
Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg Gly Tyr			
785	790	795	800
att gaa gat agt caa gat tta gag ata tat ttg att cgt tat aat gcg			2448
Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala			
805	810	815	
aaa cat gaa aca ttg gat gtt cca ggt acc gag tcc cta tgg ccg ctt			2496
Lys His Glu Thr Leu Asp Val Pro Gly Thr Glu Ser Leu Trp Pro Leu			
820	825	830	
tca gtt gaa agc cca atc gga agg tgc gga gaa ccg aat cga tgc gca			2544
Ser Val Glu Ser Pro Ile Gly Arg Cys Gly Glu Pro Asn Arg Cys Ala			
835	840	845	
cca cat ttt gaa tgg aat cct gat cta gat tgt tcc tgc aga gat gga			2592
Pro His Phe Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly			
850	855	860	
gaa aaa tgt gcg cat cat tcc cat cat ttc tct ttg gat att gat gtt			2640
Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile Asp Val			
865	870	875	880
gga tgc aca gac ttg cat gag aat cta ggc gtg tgg gtg gta ttc aag			2688
Gly Cys Thr Asp Leu His Glu Asn Leu Gly Val Trp Val Val Phe Lys			
885	890	895	
att aag acg cag gaa ggt cat gca aga cta ggg aat ctg gaa ttt att			2736
Ile Lys Thr Gln Glu Gly His Ala Arg Leu Gly Asn Leu Glu Phe Ile			
900	905	910	
gaa gag aaa cca tta tta gga gaa gca ctg tct cgt gtg aag agg gca			2784

Glu	Glu	Lys	Pro	Leu	Leu	Gly	Glu	Ala	Leu	Ser	Arg	Val	Lys	Arg	Ala	
915							920					925				
gag aaa aaa tgg aga gac aaa cgt gaa aaa cta caa ttg gaa aca aca aaa															2832	
Glu	Lys	Lys	Trp	Arg	Asp	Lys	Arg	Glu	Lys	Leu	Gln	Leu	Glu	Thr	Lys	
930							935					940				
cga gta tat aca gag gca aaa gaa gct gtg gat gct tta ttc gta gat															2880	
Arg	Val	Tyr	Thr	Glu	Ala	Lys	Glu	Ala	Val	Asp	Ala	Leu	Phe	Val	Asp	
945							950					955				960
tct caa tat gat aga tta caa gcg gat aca aac atc ggc atg att cat															2928	
Ser	Gln	Tyr	Asp	Arg	Leu	Gln	Ala	Asp	Thr	Asn	Ile	Gly	Met	Ile	His	
965							970					975				
gcg gca gat aaa ctt gtt cat cga att cga gag gcg tat ctt tca gaa															2976	
Ala	Ala	Asp	Lys	Leu	Val	His	Arg	Ile	Arg	Glu	Ala	Tyr	Leu	Ser	Glu	
980							985					990				
tta cct gtt atc cca ggt gta aat gcg gaa att ttt gaa gaa tta gaa															3024	
Leu	Pro	Val	Ile	Pro	Gly	Val	Asn	Ala	Glu	Ile	Phe	Glu	Glu	Leu	Glu	
995							1000					1005				
ggc cac att atc act gca atc tcc tta tac gat gcg aga aat gtc															3069	
Gly	His	Ile	Ile	Thr	Ala	Ile	Ser	Leu	Tyr	Asp	Ala	Arg	Asn	Val		
1010							1015					1020				
gtt aaa aat ggt gat ttt aat aat gga tta aca tgt tgg aat gta															3114	
Val	Lys	Asn	Gly	Asp	Phe	Asn	Asn	Gly	Leu	Thr	Cys	Trp	Asn	Val		
1025							1030					1035				
aaa ggg cat gta gat gta caa cag agc cat cat cgt tct gac ctt															3159	
Lys	Gly	His	Val	Asp	Val	Gln	Gln	Ser	His	His	Arg	Ser	Asp	Leu		
1040							1045					1050				
gtt atc cca gaa tgg gaa gca gaa gtg tca caa gca gtt cgc gtc															3204	
Val	Ile	Pro	Glu	Trp	Glu	Ala	Glu	Val	Ser	Gln	Ala	Val	Arg	Val		
1055							1060					1065				
tgt ccg ggg tgt ggc tat atc ctt cgt gtc aca gcg tac aaa gag															3249	
Cys	Pro	Gly	Cys	Gly	Tyr	Ile	Leu	Arg	Val	Thr	Ala	Tyr	Lys	Glu		
1070							1075					1080				
gga tat gga gag ggc tgc gta acg atc cat gaa atc gag aac aat															3294	
Gly	Tyr	Gly	Glu	Gly	Cys	Val	Thr	Ile	His	Glu	Ile	Glu	Asn	Asn		
1085							1090					1095				
aca gac gaa cta aaa ttt aaa aac cgt gaa gaa gag gaa gtg tat															3339	
Thr	Asp	Glu	Leu	Lys	Phe	Lys	Asn	Arg	Glu	Glu	Glu	Val	Tyr			
1100							1105					1110				
cca acg gat aca gga acg tgt aat gat tat act gca cac caa ggt															3384	
Pro	Thr	Asp	Thr	Gly	Thr	Cys	Asn	Asp	Tyr	Thr	Ala	His	Gln	Gly		
1115							1120					1125				
aca gct gga tgc gca gat gca tgt aat tcc cgt aat gct gga tat															3429	
Thr	Ala	Gly	Cys	Ala	Asp	Ala	Cys	Asn	Ser	Arg	Asn	Ala	Gly	Tyr		
1130							1135					1140				
gag gat gca tat gaa gtt gat act aca gca tct gtt aat tac aaa															3474	

Glu	Asp	Ala	Tyr	Glu	Val	Asp	Thr	Thr	Ala	Ser	Val	Asn	Tyr	Lys	
1145				1150					1155						
ccg	act	tat	gaa	gaa	gaa	acg	tat	aca	gat	gta	aga	aga	gat	aat	3519
Pro	Thr	Tyr	Glu	Glu	Glu	Thr	Tyr	Thr	Asp	Val	Arg	Arg	Asp	Asn	
1160		1165							1170						
cat	tgt	gaa	tat	gac	aga	ggg	tat	gtc	aat	tat	cca	cca	gta	cca	3564
His	Cys	Glu	Tyr	Asp	Arg	Gly	Tyr	Val	Asn	Tyr	Pro	Pro	Val	Pro	
1175				1180					1185						
gct	ggt	tat	gtg	aca	aaa	gaa	tta	gaa	tac	ttc	cca	gaa	aca	gat	3609
Ala	Gly	Tyr	Val	Thr	Lys	Glu	Leu	Glu	Tyr	Phe	Pro	Glu	Thr	Asp	
1190				1195					1200						
aca	gta	tgg	att	gag	att	gga	gaa	acg	gaa	gga	aag	ttt	att	gta	3654
Thr	Val	Trp	Ile	Glu	Ile	Gly	Glu	Thr	Glu	Gly	Lys	Phe	Ile	Val	
1205				1210					1215						
gat	agc	gtg	gaa	tta	ctc	ctc	atg	gaa	gaa	tag					3687
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1220				1225											

<210> 10

<211> 1228

<212> PRT

<213> *Bacillus thuringiensis*

<400> 10

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Asn	His	Ser	Ala	Gln	Met	Asp	Leu	Leu	Pro	Asp	Ala	Arg	Ile	Glu	Asp
					20			25			30				

Ser	Leu	Cys	Ile	Ala	Glu	Gly	Asn	Asn	Ile	Asp	Pro	Phe	Val	Ser	Ala
					35			40			45				

Ser	Thr	Val	Gln	Thr	Gly	Ile	Asn	Ile	Ala	Gly	Arg	Ile	Leu	Gly	Val
					50			55			60				

Leu	Gly	Val	Pro	Phe	Ala	Gly	Gln	Leu	Ala	Ser	Phe	Tyr	Ser	Phe	Leu
65					70				75			80			

Val	Gly	Glu	Leu	Trp	Pro	Arg	Gly	Arg	Asp	Gln	Trp	Glu	Ile	Phe	Leu
					85			90			95				

Glu	His	Val	Glu	Gln	Leu	Ile	Asn	Gln	Gln	Ile	Thr	Glu	Asn	Ala	Arg
						100		105			110				

Asn Thr Ala Leu Ala Arg Leu Gln Gly Leu Gly Asp Ser Phe Arg Ala

115 120 125

Tyr Gln Gln Ser Leu Glu Asp Trp Leu Glu Asn Arg Asp Asp Ala Arg
130 135 140

Thr Arg Ser Val Leu His Thr Gln Tyr Ile Ala Leu Glu Leu Asp Phe
145 150 155 160

Leu Asn Ala Met Pro Leu Phe Ala Ile Arg Asn Gln Glu Val Pro Leu
165 170 175

Leu Met Val Tyr Ala Gln Ala Ala Asn Leu His Leu Leu Leu Arg
180 185 190

Asp Ala Ser Leu Phe Gly Ser Glu Phe Gly Leu Thr Ser Gln Glu Ile
195 200 205

Gln Arg Tyr Tyr Glu Arg Gln Val Glu Arg Thr Arg Asp Tyr Ser Asp
210 215 220

Tyr Cys Val Glu Trp Tyr Asn Thr Gly Leu Asn Ser Leu Arg Gly Thr
225 230 235 240

Asn Ala Ala Ser Trp Val Arg Tyr Asn Gln Phe Arg Arg Asp Leu Thr
245 250 255

Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro Ser Tyr Asp Thr Arg
260 265 270

Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu Thr Arg Glu Val Tyr Thr
275 280 285

Asp Ala Ile Gly Ala Thr Gly Val Asn Met Ala Ser Met Asn Trp Tyr
290 295 300

Asn Asn Asn Ala Pro Ser Phe Ser Ala Ile Glu Ala Ala Ile Arg
305 310 315 320

Ser Pro His Leu Leu Asp Phe Leu Glu Gln Leu Thr Ile Phe Ser Ala
325 330 335

Ser Ser Arg Trp Ser Asn Thr Arg His Met Thr Tyr Trp Arg Gly His
340 345 350

Thr Ile Gln Ser Arg Pro Ile Gly Gly Leu Asn Thr Ser Thr His

355

360

365

Gly Ala Thr Asn Thr Ser Ile Asn Pro Val Thr Leu Arg Phe Ala Ser
370 375 380

Arg Asp Val Tyr Arg Thr Glu Ser Tyr Ala Gly Val Leu Leu Trp Gly
385 390 395 400

Ile Tyr Leu Glu Pro Ile His Gly Val Pro Thr Val Arg Phe Asn Phe
405 410 415

Thr Asn Pro Gln Asn Ile Ser Asp Arg Gly Thr Ala Asn Tyr Ser Gln
420 425 430

Pro Tyr Glu Ser Pro Gly Leu Gln Leu Lys Asp Ser Glu Thr Glu Leu
435 440 445

Pro Pro Glu Thr Thr Glu Arg Pro Asn Tyr Glu Ser Tyr Ser His Arg
450 455 460

Leu Ser His Ile Gly Ile Ile Leu Gln Ser Arg Val Asn Val Pro Val
465 470 475 480

Tyr Ser Trp Thr His Arg Ser Ala Asp Arg Thr Asn Thr Ile Gly Pro
485 490 495

Asn Arg Ile Thr Gln Ile Pro Met Val Lys Ala Ser Glu Leu Pro Gln
500 505 510

Gly Thr Thr Val Val Arg Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu
515 520 525

Arg Arg Thr Asn Thr Gly Gly Phe Gly Pro Ile Arg Val Thr Val Asn
530 535 540

Gly Pro Leu Thr Gln Arg Tyr Arg Ile Gly Phe Arg Tyr Ala Ser Thr
545 550 555 560

Val Asp Phe Asp Phe Phe Val Ser Arg Gly Gly Thr Thr Val Asn Asn
565 570 575

Phe Arg Phe Leu Arg Thr Met Asn Ser Gly Asp Glu Leu Lys Tyr Gly
580 585 590

Asn Phe Val Arg Arg Ala Phe Thr Thr Pro Phe Thr Phe Thr Gln Ile

595 600 605

Gln Asp Ile Ile Arg Thr Ser Ile Gln Gly Leu Ser Gly Asn Gly Glu
610 615 620

Val Tyr Ile Asp Lys Ile Glu Ile Ile Pro Val Thr Ala Thr Phe Glu
625 630 635 640

Ala Glu Tyr Asp Leu Glu Arg Ala Gln Glu Ala Val Asn Ala Leu Phe
645 650 655

Thr Asn Thr Asn Pro Arg Arg Leu Lys Thr Asp Val Thr Asp Tyr His
660 665 670

Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser Asp Glu Phe Cys
675 680 685

Leu Asp Glu Lys Arg Glu Leu Leu Glu Lys Val Lys Tyr Ala Lys Arg
690 695 700

Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn Phe Thr Ser Ile
705 710 715 720

Asn Lys Gln Pro Asp Phe Ile Ser Thr Asn Glu Gln Ser Asn Phe Thr
725 730 735

Ser Ile His Glu Gln Ser Glu His Gly Trp Trp Gly Ser Glu Asn Ile
740 745 750

Thr Ile Gln Glu Gly Asn Asp Val Phe Lys Glu Asn Tyr Val Thr Leu
755 760 765

Pro Gly Thr Phe Asn Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile
770 775 780

Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg Gly Tyr
785 790 795 800

Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala
805 810 815

Lys His Glu Thr Leu Asp Val Pro Gly Thr Glu Ser Leu Trp Pro Leu
820 825 830

Ser Val Glu Ser Pro Ile Gly Arg Cys Gly Glu Pro Asn Arg Cys Ala

835 840 845

Pro His Phe Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly
850 855 860

Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile Asp Val
865 870 875 880

Gly Cys Thr Asp Leu His Glu Asn Leu Gly Val Trp Val Val Phe Lys
885 890 895

Ile Lys Thr Gln Glu Gly His Ala Arg Leu Gly Asn Leu Glu Phe Ile
900 905 910

Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ser Arg Val Lys Arg Ala
915 920 925

Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Gln Leu Glu Thr Lys
930 935 940

Arg Val Tyr Thr Glu Ala Lys Glu Ala Val Asp Ala Leu Phe Val Asp
945 950 955 960

Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Gly Met Ile His
965 970 975

Ala Ala Asp Lys Leu Val His Arg Ile Arg Glu Ala Tyr Leu Ser Glu
980 985 990

Leu Pro Val Ile Pro Gly Val Asn Ala Glu Ile Phe Glu Glu Leu Glu
995 1000 1005

Gly His Ile Ile Thr Ala Ile Ser Leu Tyr Asp Ala Arg Asn Val
1010 1015 1020

Val Lys Asn Gly Asp Phe Asn Asn Gly Leu Thr Cys Trp Asn Val
1025 1030 1035

Lys Gly His Val Asp Val Gln Gln Ser His His Arg Ser Asp Leu
1040 1045 1050

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Ala Val Arg Val
1055 1060 1065

Cys Pro Gly Cys Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu

1070 1075 1080

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
1085 1090 1095

Thr Asp Glu Leu Lys Phe Lys Asn Arg Glu Glu Glu Val Tyr
1100 1105 1110

Pro Thr Asp Thr Gly Thr Cys Asn Asp Tyr Thr Ala His Gln Gly
1115 1120 1125

Thr Ala Gly Cys Ala Asp Ala Cys Asn Ser Arg Asn Ala Gly Tyr
1130 1135 1140

Glu Asp Ala Tyr Glu Val Asp Thr Thr Ala Ser Val Asn Tyr Lys
1145 1150 1155

Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp Val Arg Arg Asp Asn
1160 1165 1170

His Cys Glu Tyr Asp Arg Gly Tyr Val Asn Tyr Pro Pro Val Pro
1175 1180 1185

Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp
1190 1195 1200

Thr Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Lys Phe Ile Val
1205 1210 1215

Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1220 1225